Mobile Hop Picker

A project of University of Vermont Extension, Vermont Agency of Agriculture and Massachusetts Department of Agricultural Resources through the USDA Specialty Crops Block Grants Program.

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Callahan Engineering, PLLC
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UNIVERSITY OF VERMONT EXTENSION
CULTIVATING HEALTHY COMMUNITIES

VERMONT
AGENCY OF AGRICULTURE, FOODS & MARKETS

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MASSACHUSETTS DEPARTMENT OF AGRICULTURAL RESOURCES

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Project Team

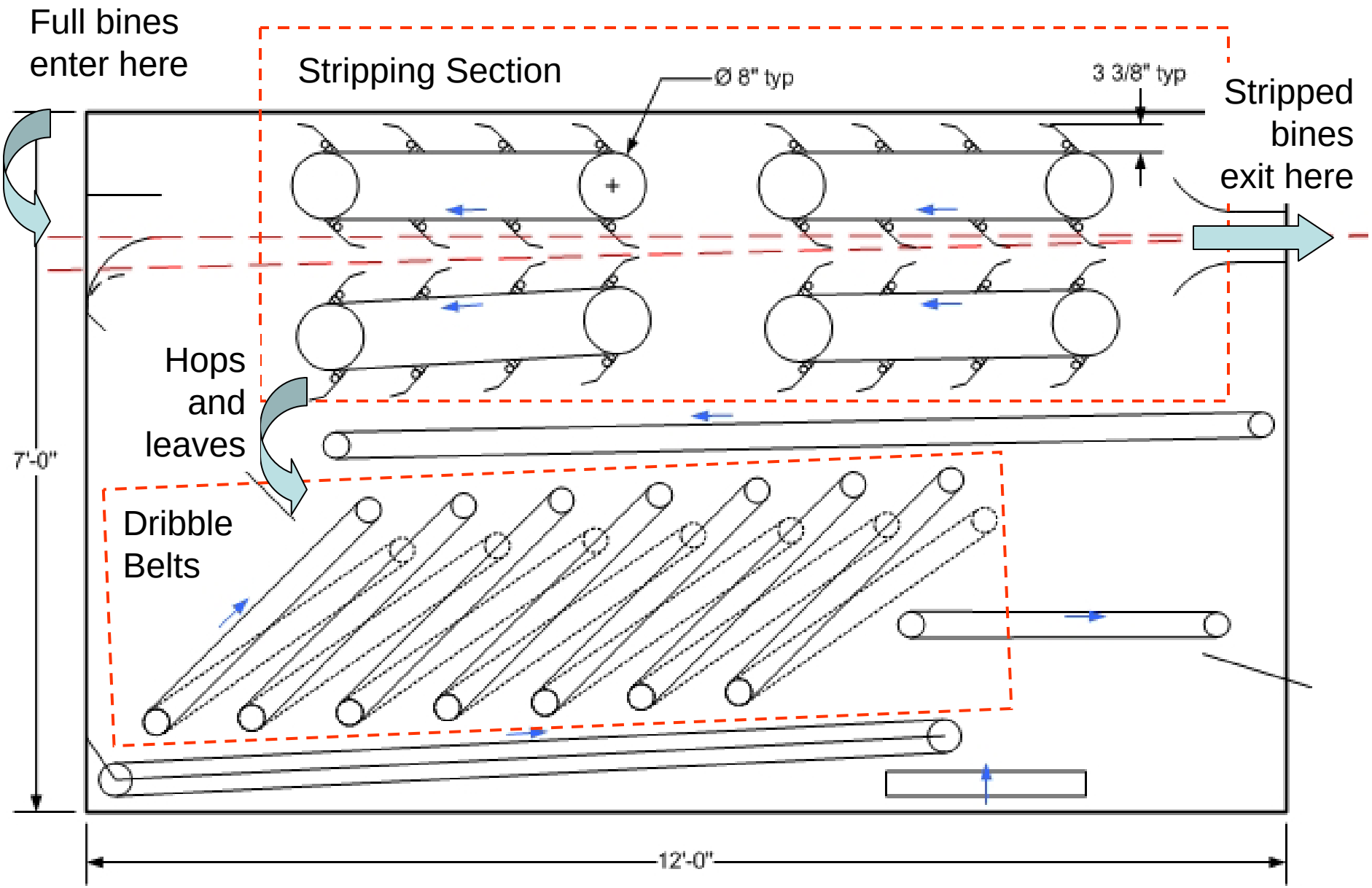
- Dr. Heather Darby (UVM Extension)
- Rosalie Madden (UVM Extension)
- Roger Rainville (Borderview Farm – Alburgh, VT)
- Gene L'Etoile (Four Star Farm – Northfield, MA)
- Paul Hendler (Shaftsbury, VT)
- Mark Magiera (Bobcat Cafe - Bristol, VT)
- Chris Callahan (Callahan Engineering, PLLC – Cambridge, NY)
- Dave Bister (Triangle Metal Fab – Milton, VT)
- With technical support & donations from several key vendors including
  - Dauenhauer Manufacturing (Hop Harvester Parts -Fresno, CA)
  - Kauffman Trailer, White Drive Products (Hydraulic Motors)
  - Prince Hydraulics (PTO Pump)
  - Charlebois Truck Parts (Burlington, VT) and
  - Sparks Belting Co. (MI).

Project Goals

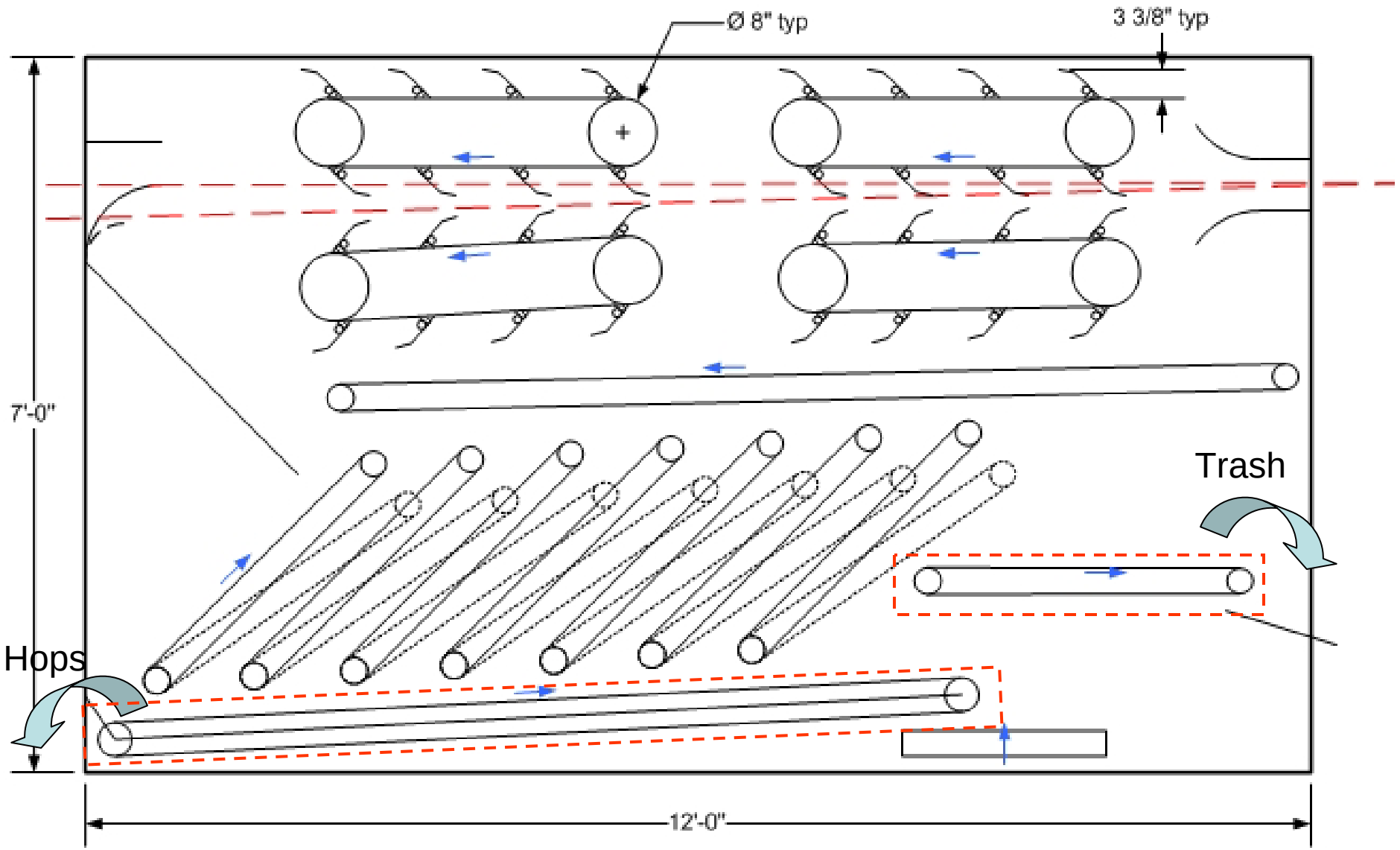
- Provide mechanical picking and cleaning capability to Northeast hops growers
- Serve multiple growers with one or two machines
- Provide outreach and education about hops and hops harvesting

Picker Design Requirements

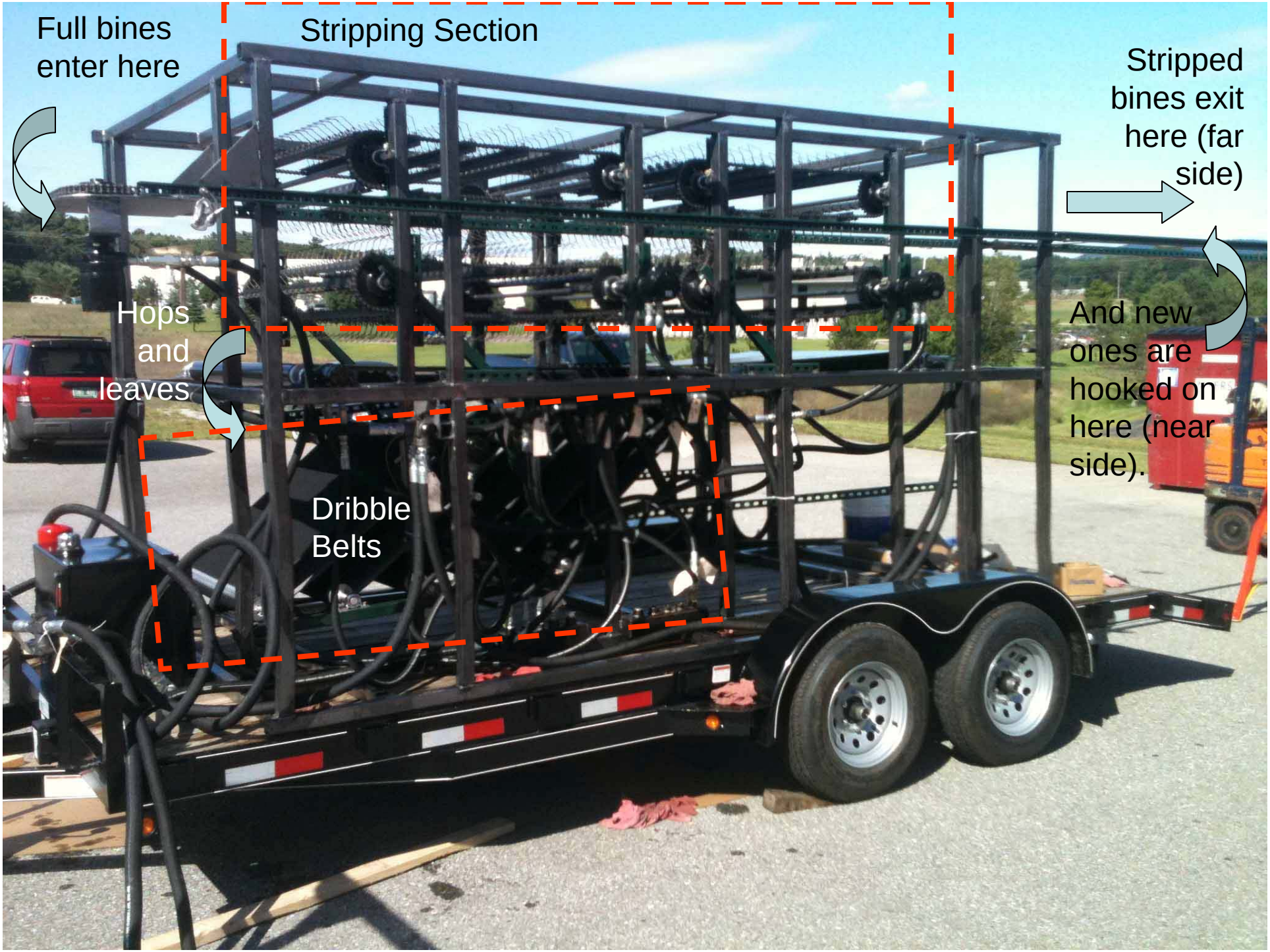
Capacity	2 bine/min 8 hr/acre 10,000 lbs/day wet {2,000 lbs/day dry}
Portability	over road with standard tow hitch
Safety	similar to farm equipment training req'd
Power	110 VAC or PTO / direct hydraulic
Cone Damage	<5% by volume
Operation	team of two trained operators


Full bines enter here
Stripping Section
Ø 8" typ
3 3/8" typ
Stripped bines exit here
Hops and leaves
Dribble Belts
7'-0"
12'-0"

SECTION A-A

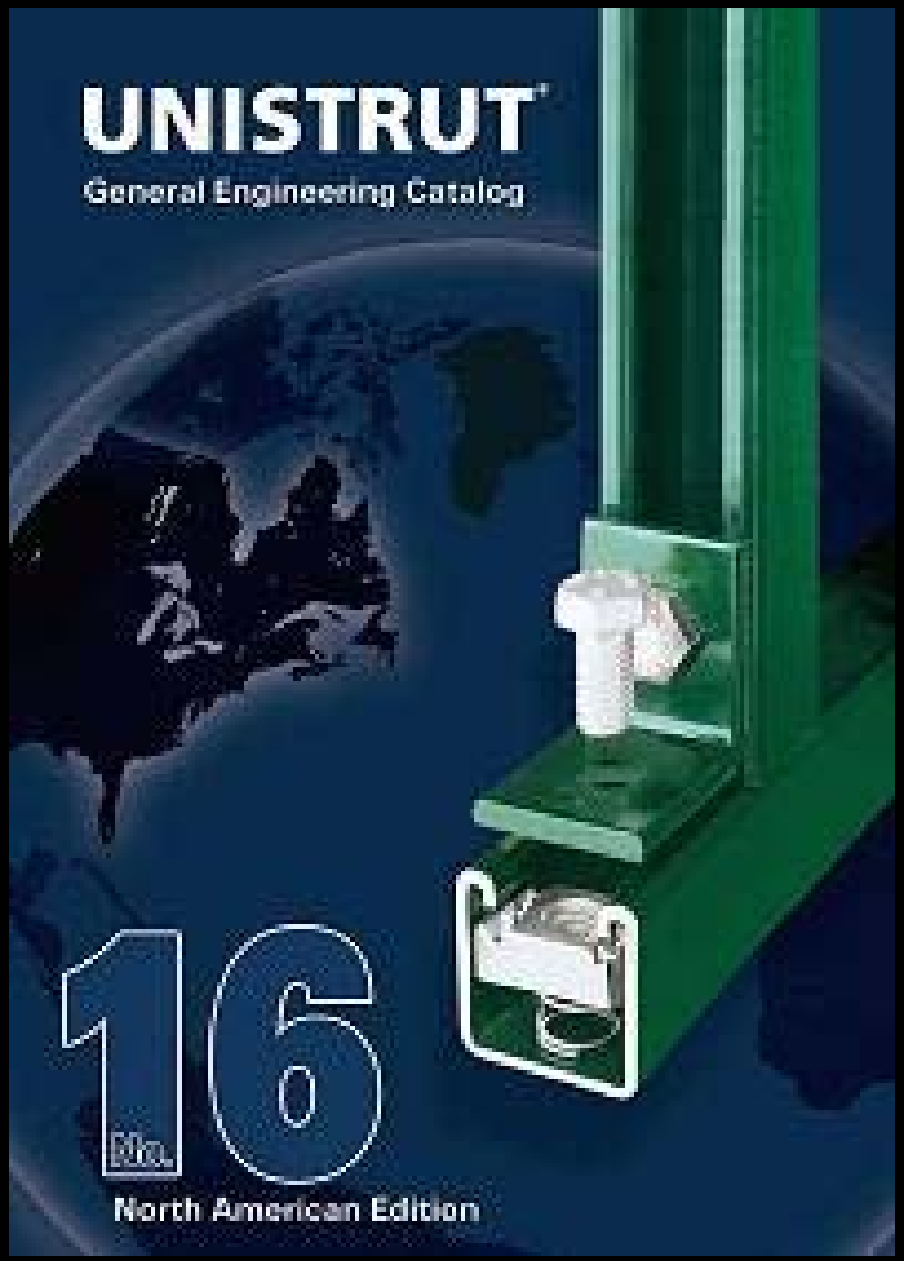


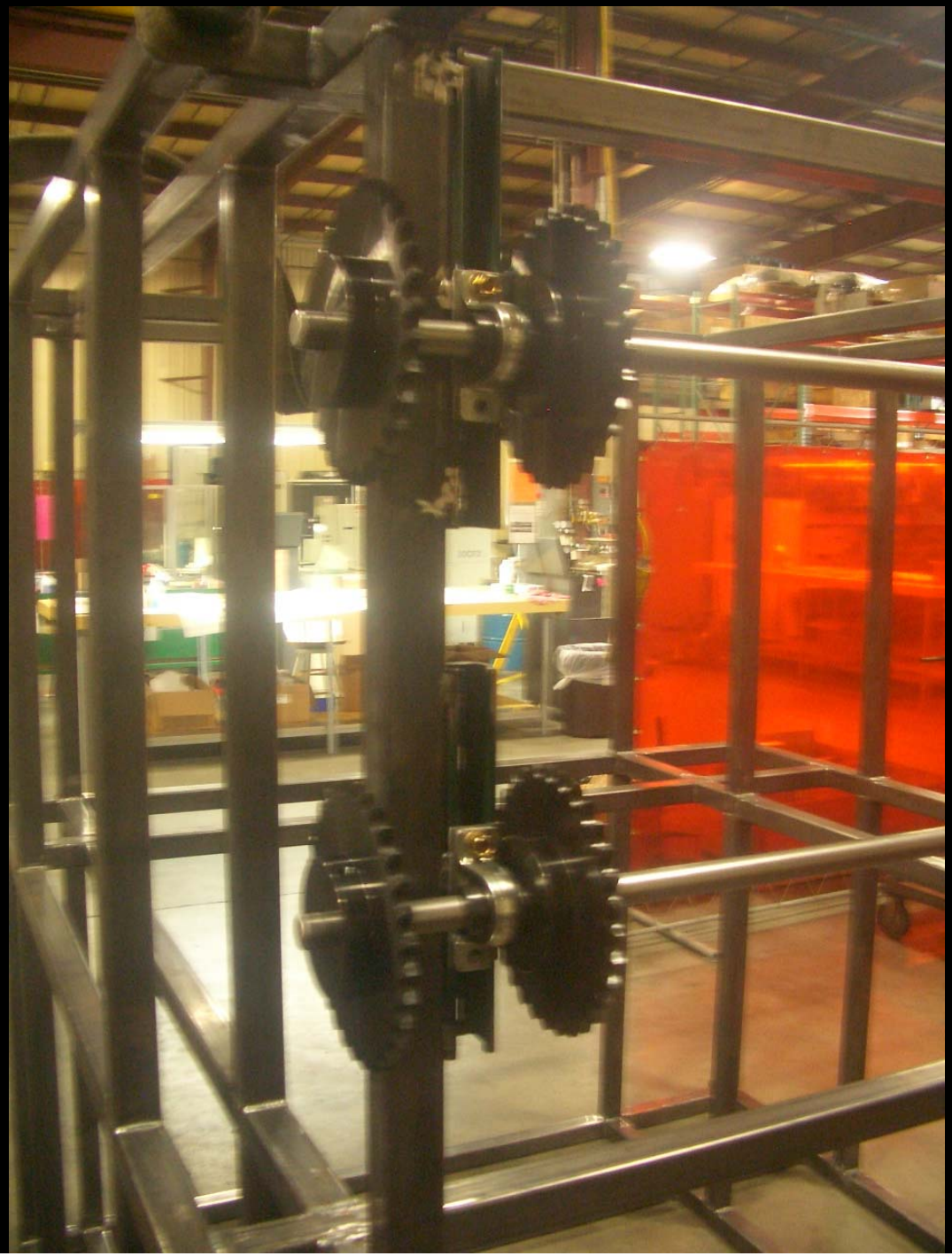
SECTION A-A


Full bines enter here
Stripping Section
Stripped bines exit here (far side)
Hops and leaves
And new ones are hooked on here (near side).
Dribble Belts

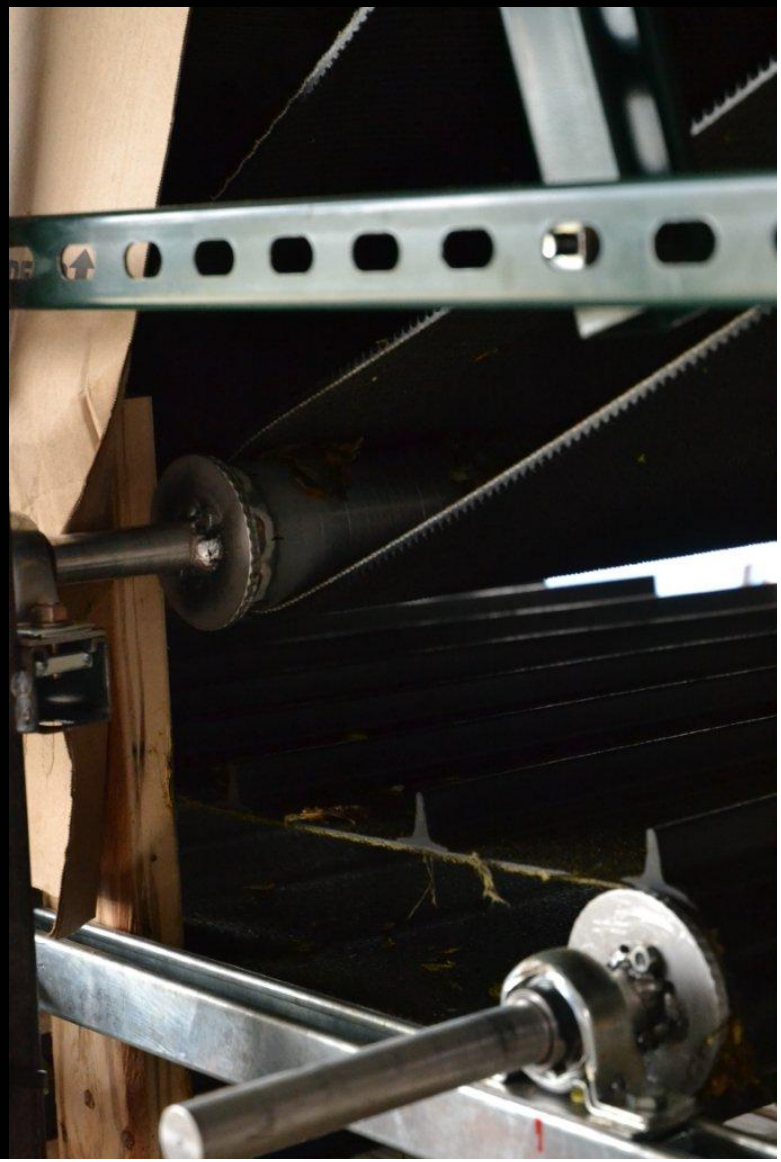
Frame – 2”x2”x0.25” Steel – Intentionally Overdesigned

Subframing - Unistrut Channel for adjustability





Sprockets, Shafts,
and Bearings



Feed and Drive Chain

Bine Hook (Unmodified, from Dauenhauer Mfg Co.)


Stripping Fingers
From Dauenhauer
Mfg Co


THE HEMINGWAYS
A PRIVATE RESIDENCE CLUB
Stripping Fingers
From Dauenhauer
Mfg Co

PTO Pump (Prince)

Hydraulic Motor (White)

Flow Control Valve

Cost Summary

Trailer	$3,500
Frame & Subframe	$1,800
Stripping Section	$4,100
Motors, Pump & Hydraulics	$5,800
Conveyor Belts & Rollers	$4,200
Bine Feed	$1,200
Total Material	$20,600
Fabrication Labor	$32,000
Total	$52,600

So Did it Work?

Yes, with some "adjustments."

Video

- Gene L'Etoile – Four Star Farms explains his hops operation and the machine
  - http://how2heroes.com/videos/field-trips/growing-harvesting-hops
- Chris' explanation on the UVM Extension Crop and Soil Team YouTube channel
  - http://www.youtube.com/watch?v=2iZIkdozeXo

Lessons Learned

- COSTS - 1st time fabrication of a prototype is expensive.
- WALKING BELTS - Conveyor tracking is challenging on short, wide belts. V-grooves are nice.
- BINE FEED – Extension on back is not completely necessary. Current design tends to pull bine toward right side of machine. (No directional panels had yet been installed for 2011 harvest).
- DRIBBLE BELTS – Gravity only separation is fine. Rough top belts. Quantity of 5. Need quicker adjustment mechanism.
- ADJUSTABILITY – Very helpful when doing different varieties, serving different farms, or when you have different maturities.

Next Steps

- Correct belt walking – steel shafts and v-grooves
- Add directional panels / chutes
- Add a hydraulic radiator
- Improve dribble belt adjustment
- Improve all belt tensioning adjustments
- Reconfigure bine feed

Thank You's

- Roger, Gene, Bonnie, Nathan, Liz, Jacob, Donny, Paul, Larry, Kate, Heather, Rosy, Kerry, Dave, Mark, & Trevor.
- White Drive Products (Dich Zachary)
- Prince Hydraulics (Scott Knaack)
- Dauenhauer Mfg. Co (Tom Frazer)
- UVM Extension
- VT Agency of Agriculture, Food and Markets
- MA Department of Agriculture
- USDA Specialty Crops Program